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August 2, 2004

Mail Stop Appeal Brief- Patents
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: Applicant(s): Sam Kao
Assignee: Tru-Si Technologies, Inc.
Title: Article Holders That Use Gas Vortices To Hold An Article In A
Desired Position
Serial No.: 09/877,366 Filed: June 8, 2001
Examiner: Kackar, Ram N. Group Art Unit: 1763
Docket No.: M-9925 US

Dear Sir:

Transmitted herewith are the following documents in the above-identified application:

- (1) Return Receipt Postcard;
- (2) This Transmittal Letter (1 page in duplicate);
- (3) Reply Brief (6 pages).

- ☐ No additional fee is required.
☒ The fee has been calculated as shown below:

CLAIMS AS AMENDED

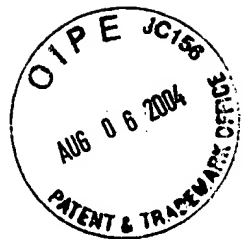
	Claims Remaining <u>After Amendment</u>		Highest No. <u>Previously Paid For</u>		Present <u>Extra</u>	<u>Rate</u>	Additional <u>Fee</u>
Total Claims	24	Minus	26	=	0	x \$18.00	\$ 0.00
Independent Claims	7	Minus	8	=	0	x \$86.00	\$ 0.00
<input type="checkbox"/>	Fee of _____ for the first filing of one or more multiple dependent claims per application						\$
<u>Total additional fee for this Amendment:</u>							\$
<input checked="" type="checkbox"/>	Conditional Petition for Extension of Time: If an extension of time is required for timely filing of the enclosed document(s) after all papers filed with this transmittal have been considered, an extension of time is hereby requested.						
<input checked="" type="checkbox"/>	Please charge our Deposit Account No. 50-2257 in the amount of						\$ <u>0.00</u>
<input checked="" type="checkbox"/>	Also, charge any additional fees required and credit any overpayment to our Deposit Account No. 50-2257						
Total:							\$ 0.00

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Michael Shenker 8-2-04
Attorney for Applicant(s) Date of Signature

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/877,366 Filing Date: June 8, 2001
Confirmation No.: 1516
First Named Inventor: Sam Kao
Assignee: Tru-Si Technologies, Inc.
Examiner: Kackar, Ram N. Art Unit: 1763
Attorney Docket No.: M-9925 US

San Jose, California
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REPLY BRIEF

Dear Sir:

This Reply Brief replies to the Examiner's Answer of July 2, 2004.

1. Claims 1-5, 8-12, 18-23 and 28-30 stand rejected under 35 U.S.C. 103(a) over Ito Kunio (JP 57045233) in view of Siniaguine (US 6139678). The Examiner states on page 4:

Regarding claims 1, 2, 4, 8, 10, 12, 21 and 28, since the article holders on the apparatus of Oleg Siniaguine in comparison to Ito Kunio are not placed symmetrically (The center of rotation is offset and away from the center of article holder-Fig 1-140X) with respect to the axis of rotation, in order to implement this teaching to the apparatus of Oleg Siniaguine, one of ordinary skill in the art would have to optimize the geometry in order to resolve the issues related to holding of the substrate due to unequal centrifugal forces and cooling effect due to larger linear velocity at the areas which are farther from the axis of rotation.

This statement is internally inconsistent. Whether or not an article holder is symmetric with respect to the axis of rotation, different parts of the holder may be at

different distances from the axis of rotation, and they may move at different velocities and experience different centrifugal forces and cooling by the ambient. Assuming that Ito Kunio's holder is symmetric with respect to the rotation axis, the holder's parts farther from the rotation axis may move at higher linear velocities and be subjected to greater cooling and centrifugal forces than the parts closer to the axis. Ito Kunio does not provide for optimization due to unequal centrifugal forces and cooling to obtain the non-identical geometries and other features recited in Claims 1, 2, 4, 8, 10, 12, 21 and 28, and thus Ito Kunio teaches that such optimization is unnecessary. Siniaguine is no more pertinent despite his holders being asymmetric with respect to the rotation axis.

2. On page 7, the Examiner discusses Claims 1-5, 8-12, 21-23, 28-30 with respect to Siniaguine and Bollinger. This is a new ground of rejection since Bollinger was not previously applied to these claims. New grounds of rejection are not allowed at this stage. See MPEP 1208, 1208.1. Nevertheless Applicant appreciates the opportunity to respond.

Issue 3: Whether Claims 1-5, 8-12, 21-23, 28-30 are unpatentable under 35 U.S.C. 103(a) over a combination of Siniaguine and Bollinger.

The claims do not stand or fall together with respect to Issue 3, but are separately patentable.

Claim 1 recites non-identical geometry:

... a combination of the first vortex chamber with all of the gas inlet and outlet passages terminating at the first vortex chamber is **not geometrically identical** to a combination of the second vortex chamber with all of the gas inlet and outlet passages terminating at the second vortex chamber.

Some embodiments of Claim 1 exploit the non-identical geometry "to compensate for other conditions that create temperature non-uniformity" (specification, page 1, lines 18-19).

Siniaguine improves plasma processing uniformity by controlling the article motion relative to the plasma (column 1, lines 44-46). The article (also called a “substrate”) is rotated so that it repeatedly passes over the plasma. “Since the substrate points that are located farther from the rotation axis move faster ..., the points farther from the rotation axis could be exposed to the plasma for less time ..., resulting in non-uniform processing” (column 2, lines 1-5). Siniaguine moves the article so that “the faster moving points travel a longer distance” through the plasma and hence “the time spent in the plasma by the faster moving points approaches the time spent by slower moving points” (column 2, lines 35-40). In achieving this goal, Siniaguine exploits a particular shape of the plasma flow cross section (column 2, lines 43-45) and simultaneously rotates the article holders 130 around two different axis 140X, 150X (Fig. 1 and column 2, lines 52-55).

Siniaguine states that his invention can be used with different types of holders, including non-contact holders (column 3, lines 46-48) and holders that hold the articles “by vacuum or by electrostatic, mechanical, or some other means” (column 3, lines 55-57). Siniaguine is not directed to the holder design and does not teach or suggest the non-identical holder geometries as in Claim 1.

Bollinger describes a holder with vortex chucks 32 (Figs. 2, 3, 5). Bollinger does not teach or suggest the non-identical geometries as recited in **Claim 1**, and Siniaguine is no more pertinent in this regard.

Further, as correctly noted by the Examiner, Bollinger treats the vortex cooling as a “cause” of temperature non-uniformity, not as a **means to overcome** the temperature non-uniformity as in some embodiments of Claim 1. Bollinger overcomes the non-uniform vortex cooling by moving the article relative to the vortex chucks:

By moving the substrate relative to and over the vortex chucks, the cooling effect is averaged over a given radius. Bollinger, column 6, lines 60-62.

In addition, Bollinger provides both a rotational and a translational motion of the article holder, and Bollinger varies the article velocity depending on the distance between the plasma and the rotation center. See column 7, lines 16-20. See also column 5, lines 20-24

(the uniform treatment is obtained by programming the relative motion of the wafer with respect to the plasma). Thus, Siniaguine and Bollinger focus on the article motion to obtain the uniform processing and not on the holder geometry features recited in Claim 1. Extensive reliance on the article motion is disadvantageous because precise motion control can be difficult to achieve and the resulting accelerations can damage the article. See Siniaguine, column 2, lines 14-19; Bollinger, column 7, lines 23-27.

In some embodiments, Applicant's use of the holder geometry relaxes the requirements that must be placed on the article motion to obtain the uniform processing. (Some embodiments of Applicant's invention can be combined with the techniques of Siniaguine and Bollinger, or can be used without such techniques. Applicant's claims are not limited to the embodiments or advantages discussed herein.)

Claims 2-5 are separately patentable for reasons similar to the reasons discussed in Applicant's Appeal Brief, pages 6-7, with respect to Issue 1.

Claim 8 recites a holder surface having first and second portions of equal areas, with the first portion having more vortex chuck outlets per unit area than the second portion.

Bollinger does not teach or suggest Applicant's invention. See Bollinger's Fig. 3 (bottom view of the holder). Siniaguine is no more pertinent. Further, Bollinger and Siniaguine do not teach or suggest using the vortex chucks to overcome the temperature non-uniformity as in some embodiments of Claim 8. Also, in some embodiments, Applicant's use of the vortex chucks advantageously relaxes the requirements that must be placed on the article motion to obtain the uniform processing. See the discussion above in connection with Claim 1.

Claim 9 is separately patentable for reasons similar to the reasons discussed in Applicant's Appeal Brief, page 8, with respect to Issue 1.

Claim 10 recites that a first surface portion "has a larger percentage of its area occupied by the vortex chuck outlets" than a second surface portion.

Bollinger does not teach or suggest this feature (see Fig. 3). Siniaguine is no more pertinent. Further, Bollinger and Siniaguine do not teach or suggest using the vortex chucks to overcome the temperature non-uniformity as in some embodiments of Claim 9. Also, in some embodiments, Applicant's use of the vortex chucks advantageously relaxes the requirements that must be placed on the article motion to obtain the uniform processing. See the discussion above in connection with Claim 1.

Claims 11-12 are separately patentable for reasons similar to the reasons discussed in Applicant's Appeal Brief, pages 8-9.

Claim 21 recites that "during operation each of the one or more first vortex chucks emits more gas per unit of time than each of the one or more second vortex chucks."

Bollinger does not teach or suggest this feature, and Siniaguine is no more pertinent. Further, Bollinger and Siniaguine do not teach or suggest using the vortex chucks to overcome the temperature non-uniformity as in some embodiments of Claim 21. Also, in some embodiments, Applicant's use of the vortex chucks advantageously relaxes the requirements that must be placed on the article motion to obtain the uniform processing. See the discussion above in connection with Claim 1.

Claims 22-23 are separately patentable for reasons similar to the reasons discussed in Applicant's Appeal Brief, pages 11-12.

Claim 28 recites first and second gas sources "operable to supply a gas to the first vortex chambers at a greater pressure than to the second vortex chambers."

Bollinger does not teach or suggest a device operable to supply gas at different pressures to different chucks 32 as recited in Claim 28. Siniaguine is no more pertinent. Further, Bollinger and Siniaguine do not teach or suggest using the vortex chambers to overcome the temperature non-uniformity as in some embodiments of Claim 28. Also, in some embodiments, Applicant's use of the vortex chambers advantageously relaxes the requirements that must be placed on the article motion to obtain the uniform processing. See the discussion above in connection with Claim 1.

Claims 29-30 are separately patentable for reasons similar to the reasons discussed in Applicant's Appeal Brief, pages 12-13.

3. With regard to Claim 18, the Examiner's Answer states on page 8:

Since this independent claim does not recite any structure this claim cannot be patentable as an apparatus claim.

A structure can be defined by a functional language, so a structure recitation is unnecessary. See MPEP 2173.05(g) and Applicant's Appeal Brief, pages 9-10.

Similar reasoning applies to the Examiner's rejection of Claims 24 and 27 on page 8 of the Examiner's Answer.

The undersigned can be contacted at the telephone number below with any questions concerning this case.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 2, 2004.

Michael Shenker
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8-2-04
Date of Signature

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